CLAIMS

What is claimed is:

1. A method for restoring a Ti alloy turbine component which has lost first material from a damage site comprising:

physically depositing a Ti-based material at least partially in place of the first material

2. The method of claim 1 wherein:

the method further comprises removing additional material at least partially from the damage site to create a base surface; and

the physically depositing deposits said Ti-based material atop the base surface at least partially in place of the first material and the additional material.

3. The method of claim 1 wherein:

said deposited Ti-based material in major part replaces said first material.

4. The method of claim 1 wherein said Ti-based material is selected from the group consisting of Ti-6Al-4V, Ti-6Al-2Sn-4Zr-2Mo, and Ti-8Al-1V-1Mo.

5. The method of claim 1 wherein the removing of additional material is, in major part, from undamaged portions of the component.

6. The method of claim 1 wherein the component is a blade having a root and an airfoil and the damage site is along a leading edge of the airfoil inboard of a midspan shroud of the airfoil.

7. The method of claim 6 wherein the damage site inboard of the midspan shroud by no more than 15% of a span of the airfoil.

8. The method of claim 1 wherein the component is a blade having a root and an airfoil and the damage site is along a leading edge of the airfoil between 20% of an airfoil span inboard of a midspan shroud of the airfoil and 10% of said span outboard of said midspan shroud.

9. The method of claim 1 wherein the component is a blade having a root and an airfoil

and the damage site is along a leading edge of the airfoil between 30% of said span inboard of a midspan shroud of the airfoil and 20% of said span outboard of said midspan shroud.

10. The method of claim 6 wherein the first material is lost to a depth of at least 2.0 mm.

11. The method of claim 1 wherein said physically depositing comprises electron beam physical vapor deposition.

12. The method of claim 1 further comprising:

applying a backing element to the component protruding adjacent the damage site after said removal so that the deposited Ti-based material builds up on the base surface and backing element.

13. The method of claim 12 further comprising:

at least partially removing the backing element and machining adjacent deposited material and preexisting material of the component to create a second base surface; and

physically depositing more of the Ti-based material atop the second base surface.

14. The method of claim 1 wherein:

wherein said physically depositing said Ti-based material comprises performing physical deposition in a manner selected from the group consisting of vapor deposition, electron beam physical vapor deposition, and electron beam flash vapor deposition.

15. The method of claim 14 wherein said physically depositing is performed at a pressure between 10^{-3} and 10^{-6} torr.

16. The method of claim 14 wherein said performing said physical deposition is performed at a pressure of approximately 10^{-4} torr.

17. The method of claim 14 wherein said physically depositing said metal is performed at a rate between 10 and 50 micrometers per minute.

18. The method of claim 14 wherein said physically depositing said Ti-based material is performed at a rate of approximately 20 micrometers per minute.